

XXXII.—*Observations on the Rodentia.* By G. R. WATERHOUSE, Esq., Curator to the Zoological Society of London.

[Continued from vol. viii. p. 84.]

CONSIDERABLE time has elapsed since I commenced the publication of my classification of the *Rodentia*, the groundwork of which was derived chiefly from the characters furnished by the skulls; and during the somewhat long intervals which elapsed between the appearance of the separate parts of the paper, I am happy to find that several mammalogists have devoted their attention to the group, and more especially Prof. A. Wagner, who has published a classification of the order in the first part of Wiegmann's 'Archiv für Naturgeschichte' for 1841\*.

Prof. Wagner objects to my classification because all the families are not reduced to their proper limits, and because some have been discarded by me which require to be re-established; had I however completed my paper, and certain families had then been left uncharacterized, part of this objection would have had more force.

The first family (*Pedimana*), according to Prof. Wagner's classification, I should not have attempted to characterize, because the single animal upon which the family is founded I have always regarded as a member of a different order—I allude to the *Cheiromys Madagascariensis*.

The second family (*Sciurina*), the third (*Myoxina*), and the fourth and fifth families (*Macropoda* and *Chinchillina*) agree perfectly with four families characterized by myself. Again, as regards our views of the contents of the family *Murina*, I find no essential difference. Prof. Wagner places in this family a few genera with the characters of which I was not sufficiently acquainted, and for that reason I omitted to introduce them.

Beyond the several families above mentioned, and the *Bathyergidæ*, none have yet been characterized in my paper.

The remaining families, according to Prof. Wagner's classification, are, *Psammoryctina*, *Cunicularia*, *Castorina*, *Hystri-cina*, *Subungulata*, and *Duplicidentata*. The genera *Lepus* and *Lagomys*, which constitute the last-mentioned family, afford such strongly marked characters, that in my tabular view of the geographical distribution and classification of the Rodents†, I was induced not only to form a family under the name *Leporidæ*, for their reception, but to regard them as constituting a section of higher value.

\* See also Annals, vol. viii. p. 50.—ED.

† Published in the Proceedings of the Zoological Society for Nov. 1839.

The *Psammoryctina* of Prof. Wagner I have long regarded as a natural group, and the genera of which it is composed were originally thrown together in the table before alluded to. The principal characters which induced me to remove those genera from other groups in which they had previously been placed, are pointed out in the introductory observations to my paper on the Rodents published in the 'Magazine of Natural History' for February 1839.

In the table published in the 'Proceedings,' however, there are two genera which are placed in juxtaposition with the others composing Prof. Wagner's family *Psammoryctina*, and which that author does not include in the family; I allude to the genera *Dasyprocta* and *Cælogenys*; on these I shall have to make some observations hereafter, as well as upon the little section of the family last mentioned, to which I gave the name *Octodontidæ* in the 'Zoology of the Voyage of the Beagle.'

The tenth family of Prof. Wagner's classification, the *Hystricina*, I have with most other naturalists regarded as a natural group, and have restricted to the same limits in the table.

The remaining three families, according to the distribution of the Rodents under consideration, are, *Cunicularia*, *Castorina* and *Subungulata*; under these three heads Prof. Wagner has grouped together various genera, as it appears to me, in an unnatural manner.

Before however I proceed to the consideration of this portion of the subject, which is the chief object of these observations, I may perhaps be permitted to take a short review of my arrangement of the order.

At the head of the Rodents are placed the Squirrels (*Sciuridæ*), which have the largest cranial cavity, the smallest development of the facial bones, and the most perfect palate; the sphenoids are broad and well-developed, and the posterior openings for the transmission of nerves from the brain are proportionately small.

In the highest mammals (*Quadrumana*) it is that we find the most perfect bony orbit for the eye, and it is in the *Sciuridæ* among Rodents that we find the orbit also most perfect. In their frugivorous diet and arboreal habits they may also be compared to the *Quadrumana*. In their dentition, moreover, the present animals evince a superiority over their congeners.

The extremities of the Squirrels are fitted for climbing and running, and their clavicles are well-developed. They differ from nearly all other Rodents in wanting a character which is observable only in this order;—I allude to an ant-orbital opening for the transmission of a portion of the masseter muscle.

The small opening in the superior maxillary bone of the *Sciuridæ* forms only a passage for the infra-orbital nerve, which in most other Rodents passes through together with the portion of the masseter muscle before alluded to. In the Hystricine section of Rodents (the *Hystricidæ*, *Echimyidæ*, *Caviidæ*, &c. &c.) the ant-orbital opening is very large, whilst in the Murine group it is moderate or small, opens obliquely upwards, and is almost separated from the opening for the nerve, which passes through a narrow slit situated below the opening for the muscle, though joining it: here we have a condition which is intermediate between the structure observable in the *Sciuridæ* and the Hystricine section.

It is in the Murine group that we find a tendency to carnivorous habits, and it is in the groups of Rodents following the *Murina* that we find the most truly herbivorous species, accompanied often by an inferiority of powers in the extremities. In fact, we find the most ruminant-like Rodents in the Hystricine section, the most carnivorous species in the *Muridæ*, and the most monkey-like in the *Sciuridæ*. Thus, in the *Rodentia* we find analogues at it were, or representatives of other great divisions of mammals\*.

The *Leporidæ* afford the greatest contrast to the *Sciuridæ* observable: here the portion of the skull devoted to the protection of the brain is very small, and the facial portion large; the palate is most imperfect and leaves exposed the sphenoids, the bodies of which, instead of being large and expanded as in the Squirrels, are remarkably contracted, and the openings for the transmission of the nerves are large. In the large orbits, separated but by a narrow bony septum, the large and united optic openings, imperfect palate, and narrow bodies of the sphenoids, we are strongly reminded of the bird's skull.

In the *Caviidæ* and *Chinchillidæ* we find the nearest approach to the structure of skull and dentition observable in the *Leporidæ*; there is nevertheless much difference; this present family is in fact the most isolated among the Rodents.

As regards the families, defined in the 'Magazine of Na-

\* A similar system of representation is frequently observable in natural groups. It is so strongly marked in the *Marsupialia*, that it has given rise to the belief with some naturalists that that is not a natural group, but is made up of members of other orders. I regard it as an error of the same kind which has led to the separation of the Sloths from the *Edentata*, and the grouping of those animals with or near to the *Quadrumana*, and the separation from the last-mentioned group of the *Galeopithec*i and the *Cheiromys*—placing the former with the *Cheiroptera*, and the latter with the Rodents.

tural History' and in the 'Annals,' it appears to me that there are some which are open to objection. I cannot feel a doubt but that the several genera associated under the heads *Sciuridæ* and *Muridæ* are naturally grouped. On the other hand, I think upon more mature consideration that the group *Arvicolidæ* requires revision. In the first place, I do not consider it as a group of equal value with the *Sciuridæ* or *Muridæ*\*. The genera *Ondatra*, *Arvicola* and *Lemmus* of authors are undoubtedly most closely allied; indeed the first and last of these so-called genera might perhaps, without impropriety, be regarded as subgenera or sections of the genus *Arvicola*. The animals composing these groups have all the essential characters of the *Muridæ*, but differ in having rootless molars and in the form of the lower jaw. They have, moreover, some peculiarities in the structure of the cranium, which have been pointed out.

Here all the characters alluded to are combined, with three true molars, the normal number in the *Muridæ*, and may be conveniently used to define the *Arvicolina* as a subfamily of that group. In my paper on the *Arvicolidæ* I had placed in that section, besides the three genera above mentioned, two others, *Ascomys* and *Castor*. These genera M. Gervais is of opinion should be arranged,—the former next the *Sciuridæ*, and the latter in that family. According to Prof. Wagner, the genus *Castor* is associated with *Myopotamus* under the family title *Castorina*, and the genus *Ascomys* forms part of his family *Cunicularia*,—a family which, in my opinion, is made up of various groups of Rodents: they all burrow in the ground, and being fitted for that habit, they have a certain superficial resemblance, as is also the case with the *Myopotamus* and the Beaver, both being aquatic animals†. With M. Gervais' views I am more inclined to agree: the two genera under consideration are undoubtedly members of the great Murine section, and certain points of resemblance in the form of the skull and lower jaw induced me to place them in the Arvicoline group. In the bony palate of *Ascomys* and *Arvi-*

\* See the 'Annals of Natural History' for October 1841, vol. viii. p. 83.

† Among the Rodents there are five truly aquatic species, (besides others which take to the water, more or less,) the Beaver, the *Ondatra*, the *Hydromys*, the *Myopotamus* and the *Hydrochæres*; the second belongs to the *Arvicolina*; the third is nearly allied to *Mus*; the fourth approaches closely to the genera *Echimys* and *Capromys*; the last is essentially a Cavy, whilst the first differs from either. In nearly every family of Rodents there are burrowing species, and many possess aquatic, climbing and burrowing species. Such facts are most common in various groups of animals.

*cola* there are some peculiarities which also had considerable weight in my determination to place those genera near to each other, inasmuch as the characters alluded to I have found in no other Rodents. On the other hand, the situation of the ant-orbital opening, and its small size, combined with the number of the teeth ( $\frac{4-4}{4-4}$ ) and their simple form, render it desirable to raise the *Ascomys* group to the rank of a subfamily. The genus *Castor* is likewise somewhat isolated; and may be regarded as a subfamily. Whether these two little sections be an offset, as it were, from the *Muridæ* or the *Sciuridæ*, is difficult at present to determine; they both want the post-orbital process to the temporal, which runs through the *Sciuridæ*; but the genus *Aplodontia* forms a connecting link to a certain extent, having rootless molars, wanting the post-orbital process, but at the same time possessing the small fifth molar in the upper jaw, placed in front of the others, which is found in no other Rodents excepting the *Sciuridæ*. The *Aplodontia*, moreover, in the form of the lower jaw, evidently links itself with the burrowing *Sciuri*. With respect to the *Myoxidæ* and *Gerboidæ* I have nothing further to add; they are well-marked sections, and it appears to me their characters cannot better be indicated in a classification than by placing them between the *Sciuridæ* and the *Muridæ*. On one point, however, I cannot quite satisfy myself, and that is the rank of these two sections,—whether they ought to be regarded as families or subfamilies. The former I am of opinion has most claim to be regarded as a family; the latter will probably merge into the *Muridæ*, and it will then be desirable to regard it as a subfamily, distinguishable by the large size of the ant-orbital opening to the skull, &c.

A very interesting new rodent, brought from Fernando Po by Mr. Fraser, naturalist to the Niger expedition, and described by me, under the name *Anomalurus Fraseri*, at the meeting of the Zoological Society for Sept. 27th, 1842, affords an interesting link, in some of its characters, between the *Myoxidæ* and the *Sciuridæ*. This animal,—which has the external appearance of a *Pteromys*, a very delicate and soft fur of a sooty colour on the upper parts of the body, freckled with yellow, and whitish beneath, and is remarkable for having on the under side of the basal third of the tail a double longitudinal series of large horny scales, with prominent angles, used by the animal to support itself on the trunks of the trees on which it lives,—has a skull nearly agreeing in general form with the Squirrels, but wanting the post-orbital process, and, what is moreover interesting, has a comparatively large ant-orbital opening, as in the *Myoxi*. The palate is contracted in

front between the molars (which are permanently  $\frac{4-4}{4-4}$ ), and is rather deeply emarginated behind\*.

Among the *Muridæ* is a tolerably well-marked section, at present limited in number of species, but to which I anticipate many novelties will be added, especially from those portions of the old world which lie between 30° and 40° north latitude, of which the genus *Spalax* may be regarded as the type, and which might conveniently be raised to the rank of a subfamily under the name *Spalacina* or *Aspalomyina* †. Agreeing essentially with the *Muridæ*, the *Aspalomyinæ* are distinguishable by the comparative great breadth of the skull, the absence or almost total absence of the vertical slit, through which in the typical *Muridæ* the infra-orbital nerve passes, and which is defended by a nearly vertical thin bony plate; and, moreover, by the equal size of the molar teeth. In this subfamily should be arranged *Spalax*, or *Aspalomys*, *Heterocephalus* (Rüppell) and *Rhizomys*.

The above families and subfamilies will therefore, according to my views, be thus arranged:—

Family 1. SCIURIDÆ; containing the genera *Sciurus*, *Pteromys*, *Sciuropterus*, *Xerus*, *Tamias*, *Spermophilus*, and *Arctomys*.

*Aberrant forms.*

Wanting post-orbital process to the frontals.

*a*, with large ant-orbital opening, and the palate contracted between the anterior molars.

\* with rooted molars  $\frac{4-4}{4-4}$  ..... *Anomalurus*.

\* From the same collection three new species of squirrels were also described by me. One, to which I gave the name *Sciurus Stangeri*; a species larger than the common squirrel, with coarse fur, freckled with black and yellow on the upper parts of the body; the abdomen very sparingly clothed, and the tail very large and bushy—also presents an interesting modification in the structure of the skull; this is unusually long, and has the ant-orbital outlet remarkably short, opening directly through the bony plate which forms the anterior root of the zygomatic arch, and not placed far forwards, and in the form of a canal, as in other squirrels which I have examined. The other two new squirrels, which were named *Sc. rufo-brachium* and *Sc. leucogenys*, are of less interest: the former resembles the *Sc. annulatus* of authors, but is rather larger, of a richer colour, and has the posterior part of the fore- and hind-legs fringed with rusty-red hairs. The *Sc. leucogenys* is of a rich brown colour above, (a tint produced by the admixture of black and rich yellow, the hairs being freckled with the latter colour,) white beneath; has the tail chiefly of a black colour, but the hairs tipped with white, and red at the base; the mesial portion of the tail beneath is, moreover, bright rusty-red; the sides of the face, as the name implies, are white. It is about equal to the common squirrel in size.

† It appears from some observations by M. Gervais ('Voyage de la Bonite') that the name *Aspalomys* of Laxmann has priority of date over that of *Spalax*, given by Guldenstedt, in which case I should take the name of the subfamily from the older name as well as that of the genus.

b, with small ant-orbital opening.

\* with rootless molars  $\frac{5-5}{4-4}$  ..... *Aplodontia*.

[Aberrant forms of *Sciuridæ*?]

\*\* with rootless molars  $\frac{4-4}{4-4}$ .

1. Folds of enamel to the molars simple ..... *Ascomys*.

2. \_\_\_\_\_ complicated..... *Castor*.

Family 2. MYOXIDÆ. Genera: *Myoxus*, *Eliomys*, *Muscardinus*, and *Graphiurus*.

Family 3. DIPODIDÆ†. Genera: *Dipus*, *Alactaga*, and *Meriones*.

Family 4. MURIDÆ. Genera: *Gerbillus*, *Psammomys*, *Mus*, *Hesperomys*, *Dendromys*, *Phlæomys*, *Cricetomys*, *Cricetus*, *Euryotis*, *Hapalotis*, *Reithrodon*, *Sigmodon*, and *Neotoma*.

Subfamily 1. *Aspalomyina*. Genera: *Rhizomys*, *Aspalomys*, and *Heterocephalus*.

Subfamily 2. *Arvicolina*. Genera: *Ondatra*, *Arvicola*, and *Lemmus*.

[To be continued.]

*See p 346*

XXXIII.—*Description of a new species of Genetta, and of two species of Birds from Western Africa.* By T. R. H. THOMSON, Esq., R.N., Surgeon of the late African Expedition.

AMONG the various specimens of natural productions which I collected during the late expedition is a new species of *Genetta*, differing very remarkably in colouring from the other species of this African genus. I received it from the Bobys or natives of the island, and they had skinned it through the mouth without making any other incision in the skin.

I have taken the opportunity of naming the *Genetta* after my friend Dr. John Richardson, the Inspector of the Naval Hospital at Haslar, so well known for his highly scientific acquirements, and so much esteemed in the naval service by all his medical brethren.

I may mention, from its being interesting as showing the wide geographic range of the animal, that I have brought home with me a large kind of cuff or arm-shield formed of the skin of *Colobus Guereza* of Rüppell, which has hitherto only been found in Abyssinia, where, according to Peirce, as quoted in the 'Synopsis of the Contents of the British Museum,' the skin is used for the same purpose. The cuff, which consists of the greater part of the back with the white stripe, differs from Dr. Rüppell's specimen of the animal in the British

† To attain uniformity of system,—taking the name of the family from one of the principal genera it contains,—I have thought it desirable to substitute the name *Dipodidæ* for *Gerboidæ*.